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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/604,154 | 06/27/2003 | Yong Zhou | GEMS8081.144 | 1153 |
| 27061 7590 05/27/2010 ZIOLKOWSKI PATENT SOLUTIONS GROUP, SC (GEMS) 136 S WISCONSIN ST PORT WASHINGTON, WI 53074 | | | EXAMINER HOFFA, ANGELA MARIE | |
| | | | ART UNIT 3768 | PAPER NUMBER |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/604,154 | ZHOU, YONG | |
| | Examiner | Art Unit | |
| | Angela M. Hoffa | 3768 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>1/16/04, 6/28/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to communication filed on September 18, 2008.

Claim Objections

2. Claims 6-13 are objected to because of the following informalities: Claim 6 recites the limitation of "a faster sampling rate", please be consistent with that which is used in Claim 1 since the two terms used appear to be directed towards the same element. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1, 3-5 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a center region being sampled after a periphery region, does not reasonably provide enablement for a center region being sampled after a center region. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with these claims. The sequence of the steps performed in claim 1 is not defined. Therefore, sequences other than those disclosed can read on the claim language, such as a center region being sampled after a center region. Since it is critical that the time delay be a function of a periphery region immediately prior to the

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center region being sampled, a center region cannot be sampled immediately after a different center region. Positively defining a sequence of steps is necessary to use this method, as the order of their performance is critical to the method.

5. Claims 1, 4-5, 6-21 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for increasing the predetermined amount of time as the peripheral region distance from the center region of k-space increases, does not reasonably provide enablement for decreasing the predetermined amount of time as the peripheral region distance from the center region of k-space increases. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with these claims. The invention is only enabled for an increase of delay time as the immediately prior sampled periphery region to that of a center region is a greater distance from the center since more signal distortion will be created by those image acquisitions from k-space areas further from the center region. Therefore, a longer time delay is required to reach steady state conditions after periphery areas imaged that are further from the center. No other conditions are contemplated or suggested in the disclosure.

Claims 9 and 11 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a delay time to increase as the periphery region increases in distance from the center region, does not reasonably provide enablement for the periphery region decreasing in distance from the center while the time delay increases. The specification does not enable any person skilled in the art to which it

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pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with these claims. The claimed feature of Claim 11 is required to enable the scope of Claim 9 since the delay time will only increase if the periphery region is further away from the center region.

6. Claim 12 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The zero-encoding pulses have zero amplitude but the claim contradicts the definition of a zero-amplitude pulse by claiming the zero-encoded pulses have variable amplitudes.

7. Claim 18 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claim requires that the zero-encoding pulse causes a delay in order to cause a disruption to steady-state dynamics. This is the exact opposite purpose of the zero-encoded pulses. They are for the purpose of maintaining steady state conditions. The description of a "disruption" is also lacking from the disclosure.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1, 3-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "wherein the predetermined period of time is a function of peripheral region distance from the center region of k-space". Since each peripheral region reasonably has a different distance from the center, which peripheral region is the distance taken from? The disclosure provides the distance to be that of the peripheral region that was sampled just prior to the center region sampling as consistent with claims 6 and 14.

Claims 16, 18, and 20 recite the limitation of "zero-encoding pulses" which lacks antecedent basis within the claim.

10. Claims 6-21 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are:

The MR imaging acquisition must utilize large encoding gradient pulses that are played out immediately before a center of k-space is sampled as specified in par. 0009, first sentence and par. 0008. The problem being overcome by the present invention is that of eddy currents and disruptions in steady state conditions created by large encoding gradient pulses that are played out immediately before a center of k-space is sampled. As such, to solve the problem, this step must be present in the invention. Claims 6 and 14 suggest that a peripheral region is sampled before the center region,

but is still silent to the requirement of the peripheral region being sampled with a sequence utilizing large encoding gradient pulses. Claim 1 does not even require a peripheral region to be sampled before that of a center region.

Claims 6 and 14 further do not claim the feature of maintaining a steady state of the MR signal to minimize signal intensity variation. This is a critical feature in order to achieve the purpose of invention. Creating a time-delay alone does not provide the solution to the problem of unsteady-state conditions arising from eddy currents and hysteresis. Further, this problem is solved by playing out a series of zero-encoding pulses during the predetermined period of time delay as specified in par. 0027. As such, the subject matter of both claims 4 and 5 are required in claims 6 and 14 to distinguish over the prior art and sufficiently solve the problem sought by using the invention.

Claims 6 and 14 both recite “an immediately preceding sampled peripheral region from the center region” but fail to recite that the computer is configured to perform the step of acquiring samples from the preceding sampled peripheral region. This step is critical to perform the data acquisition.

11. Claims 1, 3-5 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are:

The MR imaging acquisition must utilize large encoding gradient pulses that are played out immediately before a center of k-space is sampled as specified in par. 0009,

first sentence and par. 0008. The problem being overcome by the present invention is that of eddy currents and disruptions in steady state conditions created by large encoding gradient pulses that are played out immediately before a center of k-space is sampled. As such, to solve the problem, this step must be present in the invention. Claims 6 and 14 suggest that a peripheral region is sampled before the center region, but is still silent to the requirement of the peripheral region being sampled with a sequence utilizing large encoding gradient pulses. Claim 1 does not even require a peripheral region to be sampled before that of a center region.

Claim 1 further does not disclose the critical steps of determining a distance of each periphery region from the center region. The predetermined period of time is a function of peripheral region distance from the center region of k-space but no step of determining this distance is claimed.

Claim 1 further does not disclose the critical step of segmenting regions into center or periphery regions of k-space. Since the location of periphery and center regions are arbitrary locators, the step of defining these locations is necessary to make the claim definite.

Claim 1 further does not claim the step of maintaining a steady state of the MR signal to minimize signal intensity variation. However, this is a critical step in order to achieve the purpose of invention. Creating a time-delay alone, does not provide the solution to the problem of unsteady-state conditions arising from eddy currents and hysteresis. Further, this problem is solved by playing out a series of zero-encoding pulses during the predetermined period of time delay as specified in par. 0027. As

such, the features of claims 4 and 5 are required in claim 1 to distinguish over the prior art and sufficiently solve the problem sought by using the invention.

Claim 14 is missing the critical component of the center region is sampled at a faster rate than each peripheral region. Applicant admits that the center region must be acquired more frequently as in par. 0010-0012 and fig. 2. Applicant admits that there are multiple peripheral regions and only one center region, that of which is sampled at a faster rate.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent Publication 2001/0004211 to Ookawa.

Regarding Claim 1, Ookawa discloses a method of MR data acquisition comprising the steps of:

sampling peripheral regions of k-space at a pre-selected temporal rate (fig. 5-6);
waiting a predetermined amount of time before sampling a next region of k-space
if the next region of k-space is a center region of k-space, wherein the center region is sampled at a higher temporal rate (the time spent sampling is faster for the center region, the first region is shortest, fig. 5, par. 0033) and wherein the predetermined

period of time is a function of peripheral region distance from the center region of k-space (fig. 5-6, par. 0033);

otherwise sampling the next region of k-space at the pre-selected temporal rate (fig. 5);

Regarding Claim 3, Ookawa further discloses the step of increasing the predetermined period of time as the peripheral region distance from the center region of k-space increases (par. 0032-0033, fig. 5-6).

Response to Arguments

14. Applicant's arguments with respect to the rejection(s) of claim(s) 1 and 3-21 under USC 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of a newly applied reference and consideration of missing critical features of the claimed invention.

Allowable Subject Matter

15. The following is a statement of reasons for the indication of allowable subject matter: The subject matter of claims 1+4+5 together, 6+4+10, and 14+4+21+15 (after overcoming the 112 issues above) and disclosed in par. 0009 and 0027 and fig. 2 is allowable. This subject matter is allowable because the references do not fairly teach or suggest the features of maintaining the steady state conditions of imaging acquisition that utilize large encoding gradient pulses by creating delays in the sampling of center

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regions of k-space by playing out series of zero-encoding pulses depending on the distance of a previously sampled peripheral region from the center region of k-space, the delay increasing as the distance of the previously sampled peripheral region from the center region of k-space increases. However, all of these features are not currently claimed. It is recommended to adapt the language of claims 6 and 14 to amend claim 1 and placing the above features into the claim language in order to resolve the remaining issues specified above and to expedite allowance of this application.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 6815952 to Rose, US 6914429 to Ookawa, and US 6483307 to Ookawa disclose claimed features of the invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Angela M. Hoffa whose telephone number is 571-270-7408. The examiner can normally be reached on Monday - Friday, 9:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. M. H./
Examiner, Art Unit 3768

/Long V Le/
Supervisory Patent Examiner, Art Unit 3768